News Release

Defense Advanced Research Projects Agency

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DARPA DEMONSTRATES NETWORK CENTRIC TECHNOLOGIES

DARPA today announced the successful conclusion of a demonstration of advanced network centric technologies. The demonstration was held as part of a joint military exercise at White Sands Missile Range, N.M.

The autonomous control software technology highlighted in the demonstration was developed under DARPA's Program Composition of Embedded Systems (PCES) program.

"This exercise was the culmination of the PCES program," explained Dr. Joseph K. Cross, DARPA's PCES program manager. "It demonstrated how PCES software enables the effective use of joint assets to prosecute time-critical targets with constrained network resources. We were able to show how PCES technologies could find, fix, track, target, engage, and assess strikes on multiple fixed and moving targets, and enable on-board autonomy for complex UAV operations."

During the live-fire exercise, two airborne unmanned aerial vehicles (UAVs) carrying embedded autonomous control software performed intelligence, surveillance and reconnaissance (ISR) missions to find, identify and track ground targets; provide commanders with timely and accurate aim points for delivery of weapons; and support post-strike battle damage assessment. Real-time streaming imagery was passed from the UAV to operations personnel and a mission commander on the ground more than 100 miles away. After assessing potential targets, the commander, with a simple mouse click, told the UAV where ISR coverage was needed.

The PCES technology enabled the UAV to autonomously map its own path without operator input. Without this new technology, an operator on the ground would have had to plot the UAV's course via waypoints to ensure that the vehicle reached and remained in the proper position to accomplish its assigned task.

PCES software enabled the UAV to gather and send additional imagery once it had arrived at the target location to provide commanders with accurate aim points and monitor the resulting weapons strikes.

The demonstration also highlighted PCES quality of service network optimization technology. The quality of service technology allowed delivery of multiple ISR imagery feeds to the mission commander over a resource-constrained data network. Based on the commander's assigned priorities for each ISR platform, the network software managed properties of the data stream such as frame-rate,

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compression and latency to provide high-quality, persistent, and low-latency imagery while operating within available bandwidth.

The UAV used during the demonstration was the ScanEagle UAV. Major PCES contractors include Boeing Phantom Works, St. Louis, Mo. (ScanEagle UAV, systems integration); BBN, Cambridge, Mass. (systems integration, quality of service management system); Lockheed Martin, Bethesda, Md. (systems integration); Purdue University, West Lafayette, Ind. (real-time Java for the UAV); Kansas State University, Manhattan, Kan. (model-driven development and generation tools); Vanderbilt University, Nashville, Tenn. (modeling and automatic program generation and verification tools); and Washington University, St. Louis, Mo. (modeling tools).

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